



Atmospheric methane over Siberia: measurements from the 2014 YAK-AEROSIB aircraft campaign

Jean-Daniel Paris (1), Ignacio Pizzo (2), Gérard Ancellet (3), Kathy Law (3), Mikhail Yu. Arshinov (4), Boris D. Belan (4), Philippe Nédélec (5), and Cathrine Lund Myhre (2)

(1) Laboratoire des Sciences du Climat et de l'Environnement (LSCE, CEA-CNRS-UVSQ), Gif sur Yvette, France (jean-daniel.paris@lsce.ipsl.fr), (2) NILU – Norwegian Institute for Air Research, P.O. Box 100, 2027 Kjeller, Norway, (3) LATMOS/IPSL, UPMC Univ. Paris 06 Sorbonne Universités, UVSQ, CNRS, Paris, France, (4) Institute of Atmospheric Optics, SB-RAS, Tomsk, Russia, (5) Laboratoire d'Aérodynamique, CNRS-UPS, Toulouse, France

The YAK-AEROSIB program collects high-precision in-situ measurements of the vertical distribution of CO₂, CH₄, CO, O₃, black carbon and ultrafine particles distribution in the Siberian troposphere, as well as other parameters including aerosol lidar profiles, on a pan-Siberian aircraft transect. Recent efforts aim at better understanding the respective role of CH₄ emission processes in driving its large scale atmospheric variability over the region.

The October 2014 YAK-AEROSIB/MOCA campaign from Novosibirsk to Salekhard and over the Kara sea and the Yamal peninsula sampled air masses affected by local, regional and remote pollution. We analyse the contribution of local anthropogenic sources to measured CH₄ enhancements, in relation to atmospheric mixing and transport conditions.

Our analysis also attempts to detect CH₄ signal from sources of methane in the Siberian shelf and the Arctic ocean during low level flight legs over the Kara sea using the airborne measurements and a Lagrangian model coupled to potential CH₄ hydrate and geological sources. The measured CH₄ concentrations do not contradict a potential source upstream of our measurements, but the interpretation is challenging due to a very low CH₄ signal.

The challenging question of the methane budget and its evolution in Siberia leads to a need for new approaches. A new generation of airborne measurements, more flexible, is now needed.